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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Paul W. Dent

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COATS & BENNETT, PLLC

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RALEIGH, NC 27602

EXAMINER

DANIEL JR, WILLIE J

ART UNIT

PAPER NUMBER

2617

DATE MAILED: 07/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/915,895

Applicant(s)

DENT, PAUL W.

Examiner

Willie J. Daniel, Jr.

Art Unit

2617

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to applicant's submission (i.e., response) filed on 02 November 2005. **Claims 1-29** are now pending in the present application. This office action is made **Non-Final**.

Response to Appeal

2. In view of the supplemental appeal brief filed on 02 November 2005,
PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

(See conclusion section).

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on **21 April 2005** is in compliance with the provisions of 37 CFR 1.97 and is being considered by the examiner.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10-20, 26, and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- a. The term "substantially" in **claim 10** is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In addition, **claim 10** recites the limitations "...no interference..." in line 8 of the claim and "...match..." in line 10 of the claim in which the limitations are rendered indefinite because the limitations are preceded by the term "substantially".
- b. The term "substantially" in **claim 17** is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In addition, **claim 17** recites the limitation "...cancel..." in line 6 of the claim in which the

limitation is rendered indefinite because the limitation is preceded by the term “substantially”.

- c. The term "substantially" in **claim 18** is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In addition, **claim 18** recites the limitation “...cancel...” in line 4 of the claim in which the limitation is rendered indefinite because the limitation is preceded by the term “substantially”.
- d. The term "substantially" in **claim 20** is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In addition, **claim 20** recites the limitation “...cancel...” in line 8 of the claim in which the limitation is rendered indefinite because the limitation is preceded by the term “substantially”.
- e. The term "substantially" in **claim 26** is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In addition, **claim 26** recites the limitation “...match...” in line 5 of the claim in which the

limitation is rendered indefinite because the limitation is preceded by the term “substantially”.

- f. The term "substantially" in **claim 29** is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. In addition, **claim 29** recites the limitation “...match...” in line 13 of the claim in which the limitation is rendered indefinite because the limitation is preceded by the term “substantially”.
5. This list of examples is not intended to be exhaustive. The Examiner respectfully requests the applicant to review all claims and clarify the issues as listed above as well as any other issue(s) that are not listed.

Claim Objections

6. **Claims 2-9, 11-19, and 22-29** are objected to because of the following informalities:
- a. **Claim 2** recites the limitation “...of claim 1...” in line 1 of the claim. The Examiner suggests, for example, “...of claim 1, ...”.
 - b. **Claims 3-9, 11-19, and 22-28** require additional punctuation mark(s) (i.e., comma) as indicated above for claim 2.
 - c. **Claim 29** recites the limitation “...is based substantially match actual propagation...” in line(s) 12-13 of the claim. The Examiner suggests, for example, “...is based on, to

match actual propagation...” or for the applicant to clarify (i.e., be clear and concise) the claim language as supported by the specification.

Appropriate correction is required.

7. This list of examples is not intended to be exhaustive. The Examiner respectfully requests the applicant to review all claims and clarify the issues as listed above as well as any other issue(s) that are not listed.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-9 and 21-29 are rejected under 35 U.S.C. 102(e) as being anticipated by

Derryberry et al. (hereinafter Derryberry) (US 2002/0128026 A1).

Regarding **claim 1**, Derryberry discloses a method of estimating propagation channels between two or more transmitters (22, 24) and a fewer number of receivers (30) (see pg. 2, [0017]; Fig. 1), the method comprising:

transmitting information signals for said receivers (30) jointly from said two or more transmitters (22, 24), said information signals pre-filtered based on propagation channel estimates (see pg. 2, [0011-0012, 0017, 0025-0026]; Fig. 1);

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transmitting at least one dummy pilot signal (P_1 , P_2) jointly from said transmitters (22, 24), said at least one dummy pilot signal (P_1 , P_2) pre-filtered based on said propagation channel estimates (see pg. 2, [0011-0012, 0017, 0025-0026]; Figs. 1, 3 and 4); and

receiving loop back signals from said receivers having dummy pilot signal interference that is dependent on the accuracy of said propagation channel estimates (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0027]; Figs. 1-2 and 4); and

revising said propagation channel estimates based on said loop back signals (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0027]; Figs. 1 and 4).

Regarding **claim 2**, Derryberry discloses the method of claim 1 wherein revising said propagation channel estimates based on said loop back signals comprises:

correlating said loop back signals with said information signals to determine an amount of dummy pilot signal interference (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0027]; Figs. 1-2 and 4); and

adjusting said propagation channel estimates to reduce said dummy pilot signal interference in said loop back signals (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0027]; Figs. 1-2 and 4).

Regarding **claim 3**, Derryberry discloses the method of claim 1 wherein said propagation channel estimates comprise

propagation channel estimate vectors relating each said receiver (30) to said transmitters (22, 24) (see pg. 3, [0031]; Figs. 1, 3, and 4), and

further comprising determining a supplemental channel estimate vector for each one of said at least one dummy pilot signal, such that said supplemental channel estimate vectors are orthogonal to said channel estimate vectors (see pg. 3, [0031]; Figs. 1, 3, and 4).

Regarding **claim 4**, Derryberry discloses the method of claim 3 wherein pre-filtering said at least one dummy pilot signal based on said propagation channel estimates comprises pre-filtering said at least one dummy pilot signal using said supplemental channel estimate vector (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031]; Figs. 1, 3, and 4).

Regarding **claim 5**, Derryberry discloses the method of claim 1 wherein transmitting information signals for said receivers (30) jointly from said transmitters (22, 24) comprises transmitting an information signal for one receiver (30) jointly from two transmitters (22, 24) (see pg. 2, [0011-0012, 0017, 0025-0026]; Figs. 1, 3, and 4).

Regarding **claim 6**, Derryberry discloses the method of claim 5 wherein transmitting an information signal for one receiver (30) jointly from two transmitters (22, 24) comprises transmitting the information signal on two transmit polarizations, wherein each said polarization propagates through a different propagation channel (26, 28) to said receiver (30) (see pg. 2, [0011-0012, 0017, 0021, 0023-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 7**, Derryberry discloses the method of claim 1 wherein transmitting information signals for said receivers jointly from said transmitters (22, 24) comprises transmitting a combination of information signals for a first plurality of receivers (30) from each one in a larger plurality of transmitters (22, 24) (see Fig. 1).

Regarding **claim 8**, Derryberry discloses the method of claim 7 wherein said transmitters (22, 24) are radio base stations (20) (see pg. 2, [0017]; Fig. 1), and wherein

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comprises pre-filtering said information signals to form a combined transmit signal for each one of said transmitters (22, 24) (see pg. 2, [0011-0012, 0017, 0025-0026]; Figs. 1, 3, and 4),

said combined transmit signals representing differently weighted combinations of said information signals based on said pre-filtering using said propagation channel estimates (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 9**, Derryberry discloses the method of claim 8 further comprising pre-filtering said at least one dummy pilot signal, such that said combined transmit signals further comprise a weighted version of said at least one dummy pilot signal (see pg. 2, [0011-0012, 0017, 0025-0026]; Figs. 1-4).

Regarding **claim 21**, Derryberry discloses a system (10) which reads on the claimed “wireless communication network” (see pg. 2, [0017]; Fig. 1) comprising:

a processor unit (25) which reads on the claim “transmit processor” operative to form a number of transmit signals as weighted combinations of at least one individual information signals and at least one dummy signal (P_1 , P_2) by pre-filtering the information signals and the at least one dummy signal (P_1 , P_2) using propagation channel estimates (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4);

a number of transmitters (22, 24) operative to transmit said transmit signals (see Fig. 1);

a loop back signal (29) processor (20) operative to determine interference at one or more wireless receivers (30) receiving said transmit signals caused by transmission of said at least one dummy signal (P_1 , P_2) based on receiving loop back signals from the one or more wireless receivers (30) estimates (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4);

wherein said transmit processor (25) adjusts said propagation channel estimates to reduce interference caused by transmitting said at least one dummy signal based on said determined interference (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 22**, Derryberry discloses the wireless communication network (10) of claim 21 wherein said transmitters (22, 24) comprise a number of antenna elements (22, 24) on a transmitting antenna (22, 24), at least one of said antenna elements (22, 24) having a different polarization than another antenna element (22, 24) (see pg. 2, [0011-0012, 0017, 0021, 0023-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 23**, Derryberry discloses the wireless communication network (10) of claim 21 wherein said transmitters (22, 24) comprise a number of radio base stations (20) (see pg. 2, [0017]; Fig. 1).

Regarding **claim 24**, Derryberry discloses the wireless communication network (10) of claim 21 wherein said transmit processor is further operative to form a channel estimate matrix comprising the propagation channel estimates (see pg. 3, [0031, 0038]; Figs. 3-4).

Regarding **claim 25**, Derryberry discloses the wireless communication network (10) of claim 24 wherein said transmit processor (25) is further operative to form said channel estimate matrix as a channel estimate vector for each of the at least one information signals, and a channel estimate vector for each one of the at least dummy signal, wherein the channel estimate vectors for the information signals characterize actual propagation channels from each transmitter to a wireless receiver (30) for which the information signal is intended (see pg. 2, [0011-0012, 0017, 0021, 0023-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 26**, Derryberry discloses the wireless communication network (10) of claim 25 wherein the transmit processor is further operative to form the channel estimate vectors for the at least one dummy signal orthogonal to the channel estimate vectors for the one or more information signals (see pg. 2, [0011-0012, 0017, 0021, 0023-0026]; pg. 3, [0031, 0038]; Figs. 1-4),

such that if the channel estimate vectors for the information signals substantially match the actual propagation channels, where the Examiner interprets as though this step is not implemented as provided by the alternative language “if”,

the at least one dummy signal will cancel at each wireless receiver receiving the transmit signals, where this step is not implemented as provided according to the alternative language “if” as recited in the previous step above.

Regarding **claim 27**, Derryberry discloses the wireless communication network (10) of claim 21 wherein said transmit processor comprises one or more signal processors operative to perform said pre-filtering (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 28**, Derryberry discloses the wireless communication network (10) of claim 21 wherein said loop back processor (20) comprises one or more signal processor operative to determine said interference at said receivers by correlating said loop back signals with said dummy signals and said information signals (see pg. 2, [0011-0012, 0017, 0021, 0023-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Regarding **claim 29**, Derryberry discloses a wireless network processing system in a wireless communication network (10) wherein a number of transmitters (22, 24) jointly

transmit to a lesser number of receivers (30) (see Fig. 1), the wireless network processing system comprising:

a loop back signal processor to determine interference in a loop back signal from a wireless receiver caused by a dummy pilot signal being transmitted by said transmitters (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4); and

a transmit processor to adjust a transmit pre-filter being applied by said transmit processor to an information signal for the wireless receiver, and being applied to said dummy pilot signal, based on said determined interference (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4);

wherein said loop back signal processor and said transmit processor cooperate to make propagation channel estimates on which said transmit pre-filter is based substantially match actual propagation channel characteristics between said transmitters and the wireless receiver by adjusting said propagation channel estimates to reduce said determined interference (see pg. 2, [0011-0012, 0017, 0025-0026]; pg. 3, [0031, 0038]; Figs. 1-4).

Response to Arguments

9. Applicant's arguments with respect to claims 1-29 have been considered but are moot in view of the new ground(s) of rejection.
10. Regarding claims 1, 21, and 29, the Examiner suggests that applicant amend claims 1, 21, and 29 to further include a limitation such as --dummy pilot signals equal in number to a difference between said number of transmitters and receivers-- as supported by the specification in order to help move prosecution forward. The limitation is similar to claim language included in claims 10 and 20.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Willie J. Daniel, Jr. whose telephone number is (571) 272-7907. The examiner can normally be reached on 8:30-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

WJD,JR
25 June 2006


ERIKA A. GAI
PRIMARY EXAMINER